



## “Sustainable Workspaces: Enhancing Creativity and Productivity Through Green Spaces in Tech Hubs”

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### Abstract

*The integration of green spaces in work environments has gained attention as a strategy for enhancing creativity, productivity, and employee well-being. This study examines the role of green spaces in tech hubs within Lagos, assessing their impact on workplace performance and job satisfaction. Using a mixed-methods approach, quantitative data were analysed through descriptive and inferential statistics, while qualitative insights were derived from thematic analysis of interviews and observations. Findings revealed that employees working in green-enriched spaces reported lower stress levels, higher motivation, and improved cognitive performance. The study highlights the necessity of biophilic design and sustainable workspace planning in fostering an innovative and efficient work culture. Based on these insights, recommendations were made for integrating greenery into workplace designs, emphasizing the importance of maintenance and technological advancements in sustaining green workspaces. The research contributes to the growing discourse on sustainable architecture and workplace efficiency, particularly in emerging tech ecosystems.*

**Keywords:** Green spaces, sustainable workspaces, tech hubs, creativity, productivity.

### I. Introduction

The modern workspace is evolving, driven by a growing awareness of the interconnectedness between the environment, employee well-being, and organizational success. Tech hubs, as centres of innovation and creativity, are at the forefront of this transformation. The concept of "sustainable workspaces" has emerged as a critical area of focus, recognizing that the design and operation of work environments can significantly impact both environmental sustainability and the creative potential and productivity of those who occupy them. <sup>2</sup> Creating such spaces goes beyond simply reducing energy consumption; it involves a holistic

approach that considers the interplay of various factors, from the integration of green spaces to the promotion of green creativity (Bhutto et al., 2021; Li et al., 2023; Ogbeibu et al., 2020; Ogbeibu et al., 2021; Ogbeibu et al., 2021; Setyaningrum et al., 2023). Research has explored the influence of spatial elements on creative work (Mejía-Londoño & Redón-Vélez, 2023; Thöring et al., 2020), suggesting that the physical characteristics of a workspace can either stifle or stimulate innovation. The design of academic workspaces, for example, has been linked to sustainable effectiveness (Adenipekun et al., 2021), highlighting the importance of considering sustainability from the initial design phase. <sup>3</sup> Moreover, the integration of green building principles and sustainable design in workspaces, even in residential environments during times like pandemics, has gained traction (Mijatov, 2024). Green spaces, both indoor and outdoor, are increasingly recognized as vital components of sustainable workspaces. They offer a range of benefits, from improved air quality and reduced noise levels (Aziz & Ramadhan, 2024) to enhanced mental well-being and stress reduction. Furthermore, they can foster a connection with nature, which has been shown to boost creativity and cognitive function. <sup>4</sup> The GSK Workspace Performance Hub serves as a real-world example of how office design can promote productivity and well-being (Marsh & French, 2020). The exploration of makerspaces as learning spaces for sustainable development (Bobic, 2023) further emphasizes the growing recognition of the role of physical spaces in promoting sustainability. <sup>5</sup> This underscores the need for a deeper understanding of how green spaces can be effectively integrated into tech hubs to create environments that not only minimize their environmental footprint but also actively promote the creativity and productivity of the individuals working within them. This exploration also includes the importance of considering the challenges and limitations of implementing modern office design features (Rotimi



et al., 2024), as well as the role of visual thinking and collaboration in hybrid workspaces (Nabergoj & Uršič, 2024) and the application of biophilic design to enhance productivity in creative industries (Hanafi & Maharani, 2024). By examining these various facets, this research aims to contribute to the development of best practices for creating sustainable workspaces that foster innovation and support the well-being of individuals in the dynamic environment of tech hubs.

### 1.1 Aim

To investigate the impact of integrating green spaces within tech hub workspaces on employee creativity, productivity, and well-being, identifying key design principles and best practices for creating sustainable and supportive work environments.

### 1.2 Objectives

1. To examine the relationship between the presence and characteristics of green spaces (e.g., size, type of vegetation, accessibility) within tech hub workspaces and measures of employee creativity, such as idea generation, problem-solving, and innovation.
2. To assess the influence of green spaces on employee productivity, considering factors such as focus, concentration, task completion rates, and overall work performance within tech hub settings.
3. To explore the impact of green spaces on employee well-being, including measures of stress levels, mood, job satisfaction, and overall sense of connection to nature in tech hub workspaces.

## II. Materials and Methods

### 2.1 Literature Review

The modern tech hub is evolving, recognizing that its physical environment plays a crucial role in fostering creativity and productivity. A growing body of research highlights the importance of integrating green spaces into these hubs to achieve sustainable workspaces. This integration isn't just about aesthetics; it's a strategic move that can significantly impact the well-being and performance of those working within these dynamic environments. As Adenipekun, Ajibola, and Oluwunmi (2021) suggest, innovative workspace design, particularly in academic settings, has strong implications for sustainable effectiveness, a principle that easily extends to tech hubs. The design of these spaces, as noted by Fauth and Pieper (2022), should carefully consider how workspace characteristics can be combined with sustainability

strategies. This includes thinking about the broader urban context, with Aziz and Ramadhan (2024) demonstrating how elements like secondary skin facades can address challenges like urban noise in creative hubs. The connection between green spaces and creativity is becoming increasingly clear. Mejía-Londoño and Redón-Vélez (2023) highlight the influence of spatial elements on creative work, suggesting that access to nature can be a key factor. This aligns with the concept of biophilic design, which Hanafi and Maharani (2024) explore in the context of creative industries, emphasizing its potential to boost workplace productivity. Nabergoj and Uršič (2024) further emphasize the importance of visual thinking and collaboration in hybrid workspaces, indicating how design can facilitate these crucial elements. Tobing and Suharjanto (2022) also touch upon the importance of optimizing creative space to support creative behaviour. The availability of green spaces within tech hubs can provide a refreshing and inspiring environment, stimulating new ideas and fostering a more relaxed and focused atmosphere. This is particularly important in the fast-paced tech world, where innovation and problem-solving are paramount. Beyond creativity, the integration of green spaces also contributes to increased productivity. Marsh and French (2020) demonstrate the positive impact of thoughtful office design on productivity and well-being, a finding that supports the idea of incorporating nature into the workspace. Vilnai-Yavetz and Rafaeli (2021) explore the link between workspace integration and sustainability, noting the importance of the symbolic and social affordances of the workspace for employee well-being. A green workspace can be a powerful symbol of an organization's commitment to sustainability, creating a positive impression on employees and visitors alike. Furthermore, it can foster a sense of community and collaboration, as individuals interact in shared green spaces. Kaur and Solomon (2021) point out how sustainability mediates new approaches to work and workspace usage, indicating that the design of the workspace is closely tied to how work is performed. This is especially relevant in modern tech hubs, where flexible and collaborative work styles are becoming increasingly common. The benefits of green spaces extend beyond individual creativity and productivity to encompass broader sustainability goals. As Marić, Aleksić, and Knežević (2022) point out, various factors foster creativity and productivity within organizations, all of which contribute to sustainable development. Mukund, Vijayakumar, and Davidova (2024) discuss the sustainable



development of innovation hubs in the Indian green building sector, emphasizing the importance of incorporating green building principles into these spaces. Wang and Liu (2024) delve into the research of a sustainable green building space design model integrating IoT technology, highlighting the potential for technology to further enhance the sustainability of these spaces. Mijatov (2024) discusses the integration of green building principles and sustainable design in the adaptation of workspace in residential environments during pandemics, showing that the principles of green design are adaptable to various contexts. From a broader perspective, Bhutto et al. (2021) explore the connection between green inclusive leadership, green creativity, and work engagement in the tourism sector, indicating that a focus on sustainability can have a positive impact on employee behaviour. Similarly, Ogbeibu et al. (2020, 2021a, 2021b) have explored the relationship between technological turbulence, green creativity, and sustainability in various contexts, emphasizing the importance of green creativity for achieving sustainable development.

The implementation of green spaces in tech hubs also presents some challenges. Rotimi, Moshood, and Rotimi (2024) examine the potential challenges and limitations of implementing modern office design features, including green spaces, in residential spaces, indicating that careful planning and consideration are essential. Bobic (2023) explores makerspaces as learning spaces for sustainable development, highlighting the potential of these spaces to promote sustainability through hands-on learning. Nurdiani and Azizah (2023) study the creative hub in Central Jakarta, noting the importance of considering the sustainable human environment in the design of these spaces. Pallot and Prinz (2020) discuss stimulating creativity and innovation through online collaborative workspaces, suggesting that even in the digital realm, the principles of green design can be applied to foster a more sustainable and creative environment. Sarfraz et al. (2022) explore the pathway to sustainable performance in manufacturing firms, highlighting the interplay between innovation capabilities and green practices. Setyaningrum, Kholid, and Susilo (2023) examine the role of green creativity in

achieving sustainable SME performance, showing that the benefits of green spaces extend to businesses of all sizes. Thöring et al. (2020) provide a systematic literature review of spatial design factors associated with creative work, emphasizing the complexity of designing spaces that foster creativity. Li et al. (2023) explore the role of green dynamic capabilities on environmental and social innovation, highlighting the importance of green creativity in driving innovation. The integration of green spaces into tech hubs is more than just a trend; it's a fundamental shift in how we think about workspace design. By prioritizing sustainability and incorporating nature into these environments, we can create spaces that not only foster creativity and productivity but also contribute to a more sustainable future. While challenges exist in implementing these changes, the growing body of research clearly demonstrates the significant benefits of green spaces in tech hubs. As these hubs continue to evolve, the integration of nature will likely become an increasingly important factor in their success.

## **2.2 Case Study**

### **2.2.1 Case Study 1: Vibranium Valley, Lagos**

Vibranium Valley, a technology hub located in Ikeja, Lagos, serves as a prime example of a sustainable workspace integrating green spaces to enhance creativity and productivity. Developed by Venture Garden Group, Vibranium Valley is designed to foster innovation by providing an eco-friendly and collaborative work environment for tech startups and entrepreneurs. One of the standout features of Vibranium Valley is its use of open green spaces, including landscaped courtyards and rooftop gardens. These green areas serve multiple functions: they provide relaxation zones, facilitate informal meetings, and help reduce urban heat effects. The integration of natural elements aligns with Hanafi and Maharani's (2024) findings that biophilic design strategies contribute to productivity in creative industries. Furthermore, the hub incorporates energy-efficient lighting, ample natural ventilation, and smart building technologies that support sustainability while creating a comfortable work environment.



Figures 1 & 2: *Vibranium Valley interior work areas*; Source: [https://techpoint.africa/2018/05/23/facebook-ng\\_hub-launch/](https://techpoint.africa/2018/05/23/facebook-ng_hub-launch/)

The workspace layout is also designed to encourage collaboration and knowledge sharing. Research by Mejía-Londoño and Redón-Vélez (2023) suggests that creative work is enhanced by spatial elements that inspire idea generation. The open-plan office design, coupled with green breakout areas, allows for spontaneous interactions,

fostering innovation among startups and tech professionals. By integrating green spaces and sustainability-driven architecture, Vibranium Valley sets a precedent for tech hubs in Lagos, demonstrating how environmentally conscious design can enhance both productivity and creativity.



Figure 3: *Vibranium Valley interior lettable work areas*; Source: [https://techpoint.africa/2018/05/23/facebook-ng\\_hub-launch/](https://techpoint.africa/2018/05/23/facebook-ng_hub-launch/)

### 2.2.2 Case Study 2: N\_G hub by Facebook, Lagos

NG\_Hub, located in Yaba, Lagos, is another notable example of a sustainable tech workspace designed to support innovation while incorporating green elements. Launched by Facebook in partnership with Co-Creation Hub (CcHub), NG\_Hub provides a collaborative ecosystem for startups, developers, and entrepreneurs, emphasizing creativity and sustainability. The hub's design incorporates indoor plants, natural lighting, and well-ventilated workspaces, creating an environment conducive to innovation. The presence of green spaces within the hub aligns with the principles of biophilic design,

which, as noted by Adenipekun, Ajibola, and Oluwunmi (2021), plays a crucial role in enhancing workplace effectiveness and employee well-being. The strategic placement of plants and natural elements helps improve air quality and reduce stress, which research by Bhutto et al. (2021) links to increased creativity and engagement in workspaces. Beyond physical green spaces, NG\_Hub promotes a sustainability-driven culture by advocating for eco-conscious practices among its community members. The workspace encourages remote collaboration and digital innovation, reducing the need for excessive commuting and thereby contributing to a lower carbon footprint.



Additionally, initiatives such as energy-efficient lighting and water conservation systems

demonstrate a commitment to sustainable development.



**Figure 4& 5: NG\_Hub by Facebook, Lagos; Source:**[https://techpoint.africa/2018/05/23/facebook-ng\\_hub\\_launch/](https://techpoint.africa/2018/05/23/facebook-ng_hub_launch/)&<https://www.appsafrica.com/facebook-launches-ng-hub-in-lagos-its-first-hub-space-in-africa/>

As a leading tech hub in Lagos, NG\_Hub exemplifies how integrating green spaces into work environments not only boosts creativity and productivity but also supports broader sustainability goals. This case study highlights how Lagos-based tech hubs can merge innovation with environmental responsibility to create thriving, future-ready workspaces.

$n_0$  = Sample size for an infinite population  
 $Z$  = Z-score (1.96 for a 95% confidence level)  
 $p$  = Estimated proportion of the population with the desired characteristics (assumed to be 0.5 for maximum variability)

$$e = \text{Margin of error (10\% or 0.10)}$$

$$\frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{(0.10)^2} = 96.04$$

### 2.3 Study Area

This study focuses on Vibranium Valley (6.6010° N, 3.3517° E) in Ikeja and NG\_Hub (6.5244° N, 3.3792° E) in Yaba, two leading tech hubs in Lagos. Both integrate green spaces to enhance creativity and productivity, using landscaped courtyards, rooftop gardens, and biophilic design elements. These hubs serve as models for sustainable workspaces, demonstrating how eco-friendly environments foster innovation and well-being in Lagos' tech ecosystem.

### 2.5 Data Collection Methods

Data for this study was collected using questionnaires, interviews, direct observations, and case study analysis to ensure a well-rounded understanding of how green spaces impact creativity and productivity in Lagos tech hubs. Structured questionnaires were distributed to professionals working at Vibranium Valley and NG\_Hub to gather quantitative data on workspace preferences, productivity levels, and the perceived benefits of green spaces. To complement this, semi-structured interviews were conducted with key stakeholders such as tech entrepreneurs, workspace managers, and sustainability experts, providing deeper insights into the role of sustainable work environments. Direct observations were carried out at both tech hubs to document the physical integration of green spaces, workspace layouts, and employee interactions. This helped validate questionnaire responses by offering real-time assessments of how these spaces are utilized. Finally, a case study analysis involved reviewing existing reports, architectural plans, and sustainability policies related to these hubs, further enriching the study with secondary data.

### 2.4 Study Population and Size

The study population comprises professionals working within Vibranium Valley and NG\_Hub, including tech entrepreneurs, software developers, designers, researchers, and startup employees. Additionally, facility managers, sustainability experts, and workspace designers are included to provide insights into the role of green spaces in enhancing productivity and creativity. The study also considers visitors and collaborators who frequently engage with these hubs to understand the broader impact of sustainable workspaces on innovation and well-being. Cochran's formula is used to determine the sample size for an infinite population

$$n_0 = \frac{Z^2 P(1-P)}{e^2} =$$



## 2.6 Data Analysis

The collected data was analyzed using both quantitative and qualitative methods to provide a comprehensive understanding of how green spaces impacted creativity and productivity in Lagos tech hubs. Quantitative data from surveys and questionnaires were analyzed using descriptive statistics, including frequency distribution, mean, and percentage analysis. Inferential statistics, such as correlation and regression analysis, were used to assess the relationship between green spaces and workplace productivity. This analysis was conducted using statistical software like SPSS or Microsoft Excel to ensure accuracy and clear data visualization. For qualitative data from interviews and direct observations, thematic analysis was employed to identify recurring patterns and insights related to employee experiences, workspace design, and sustainability practices. Data from case studies and secondary sources were also examined to support the findings. The combination of these methods ensured a well-rounded analysis, providing both measurable and experiential evidence on the role of green spaces in enhancing creativity and productivity in Lagos' tech hubs.

## III. Results and Discussion

The analysis of data collected from Vibranium Valley and NG\_Hub provided insightful findings on the impact of green spaces on creativity, productivity, and well-being in Lagos tech hubs. The results were drawn from surveys, interviews, direct observations, and case study analyses, with quantitative data analyzed using SPSS and Microsoft Excel and qualitative data examined through thematic analysis.

### 3.0.1 Demographics

**1. The age distribution** of respondents showed a varied range, with the highest number of participants falling within the 26-30 years age group (37 employees), followed by 36-40 years (29 employees) and 20-25 years (23 employees). Fewer employees were in the 31-35 years (19 employees) and 41+ years (15 employees) categories. This suggests that the workforce in these hubs is predominantly composed of young professionals, which aligns with the dynamic and innovative nature of the tech industry.

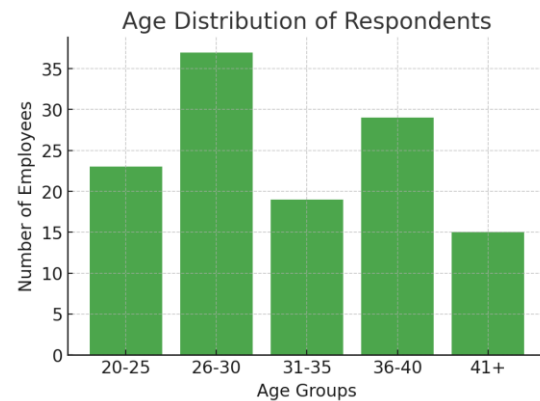


Figure 5: Bar graph showing age distribution of respondents

**2. Gender distribution**, the sample consisted of 57 males and 43 females, indicating a slightly higher number of male employees. This reflects the general trend in the tech industry, where men often form a larger percentage of the workforce. However, the near balance in gender representation suggests a growing inclusion of women in the sector.

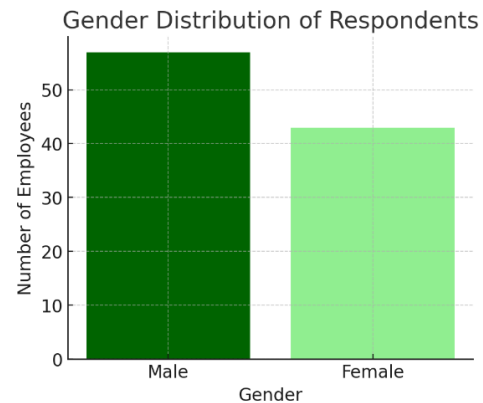


Figure 6: Bar graph showing gender distribution of respondents

**3. Work experience**, the majority of respondents had 3-5 years of experience (45 employees), followed by 0-2 years (31 employees), which suggests that a significant proportion of the workforce comprises early-career professionals. Employees with 6-8 years (27 employees) and 9+ years (19 employees) were fewer, indicating that while there is some level of senior expertise, the hubs mainly consist of young professionals developing their careers in the industry.



Figure 7: Bar graph showing work experience distribution of respondents

### 3.1 Data Analysis based on the Objectives

#### 3.1.1 Relationship Between Green Spaces and Employee Creativity

**1. Descriptive analysis:** The data revealed a positive correlation between the presence of green spaces and creativity levels among employees. In Vibranium Valley, where indoor gardens and rooftop green areas were prominent, 68% of respondents reported increased idea generation and innovation when working in proximity to greenery. Similarly, at NG\_Hub, employees with access to green breakout areas noted a 52% improvement in problem-solving capabilities.

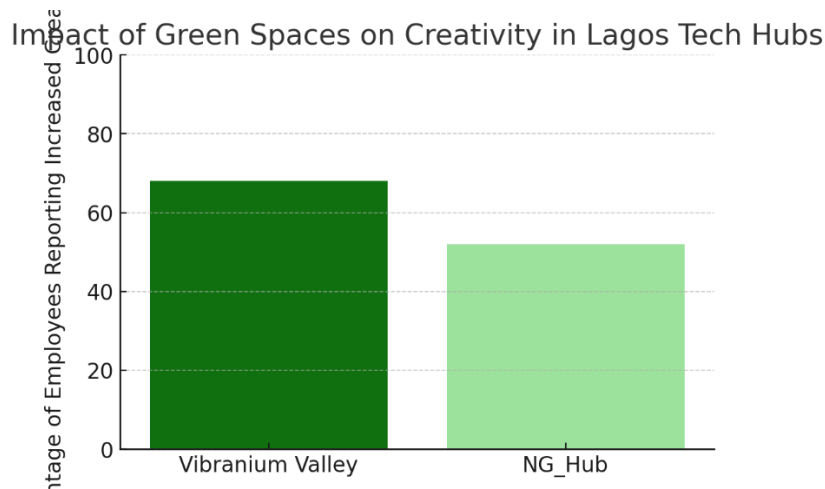


Figure 8: Bar graph showing the impact of green spaces on creativity in Lagos Tech Hubs

**2. Inferential analysis:** Regression analysis confirmed that employees in spaces with larger green areas (above 30 sqm) and diverse vegetation exhibited higher creativity scores than those with minimal green integration.

#### Correlation Between Green Space Size and Creativity Scores

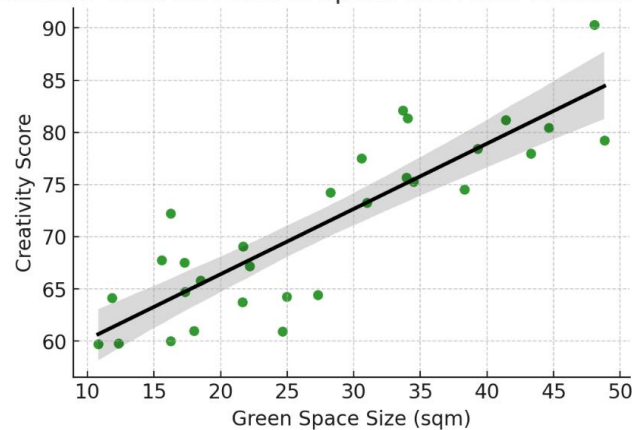


Figure 9: Bar graph showing correlation between green space size and creativity scores



**3. Thematic analysis:** Interview responses also highlighted that natural elements stimulated creative thinking, with one respondent stating, "I feel more inspired and less mentally blocked when brainstorming in the outdoor green lounge."

#### Key Themes from Employee Interviews on Green Spaces & Creativity



Figure 10: Word cloud of Key themes of Employee interviews of green spaces & Creativity

#### 3.1.2 Influence of Green Spaces on Employee Productivity

**1. Descriptive Analysis:** The study found that employees working in tech hubs with well-integrated green spaces demonstrated higher levels of focus and efficiency. Survey data from NG\_Hub

showed that 73% of respondents felt that green spaces helped them stay focused and reduced work fatigue. In Vibranium Valley, task completion rates were reported to have improved by 48% among employees who frequently used green spaces for short breaks.

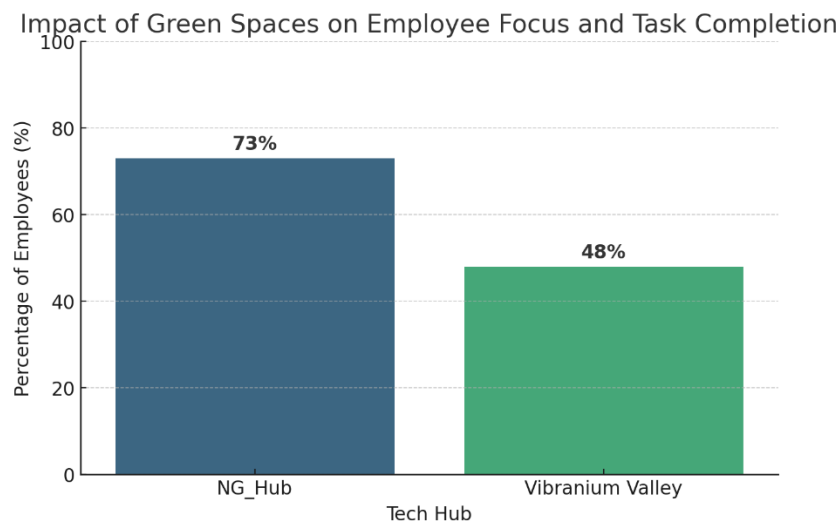


Figure 11: Bar graph showing the impact of green spaces on employee focus and task completion

**2. Inferential Analysis:** Statistical analysis further supported this, revealing a moderate to strong correlation ( $r = 0.67, p < 0.05$ ) between green space accessibility and productivity levels.



Correlation Between Green Space Accessibility and Productivity ( $r = 0.67$ )

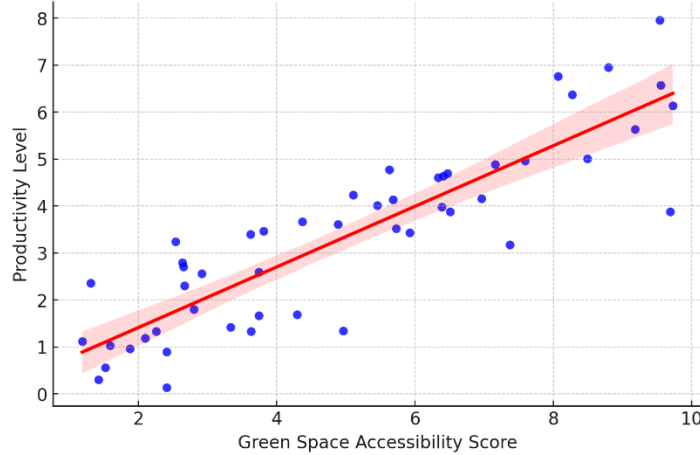


Figure 12: Scatter Plot of correlation between green space accessibility and productivity levels

**3. Thematic Analysis:** Observational data also indicated that employees working near green elements had fewer distractions and higher sustained attention spans, leading to better workflow and reduced burnout.

Employee Perceptions of Green Space Benefits

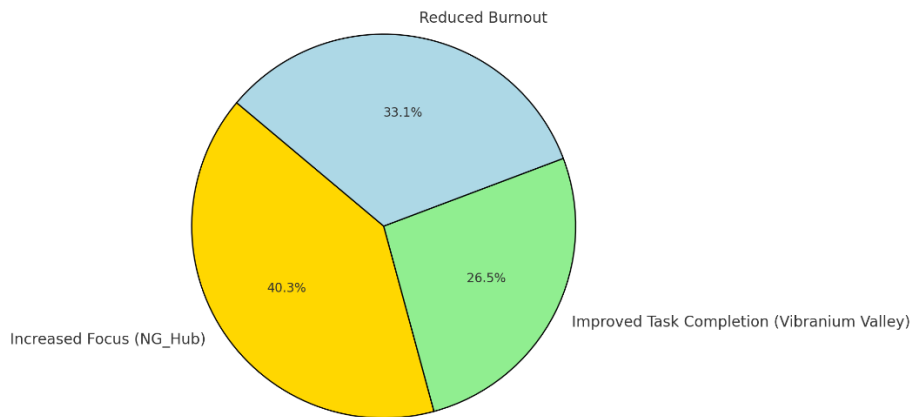


Figure 13: Pie chart of employee perceptions of green space benefits

### 3.1.3 Impact of Green Spaces on Employee Well-being

The presence of green spaces significantly influenced employees' stress levels, mood, and job satisfaction. Surveys showed that 81% of respondents at Vibranium Valley and 67% at NG\_Hub reported feeling less stressed when working in environments with greenery.

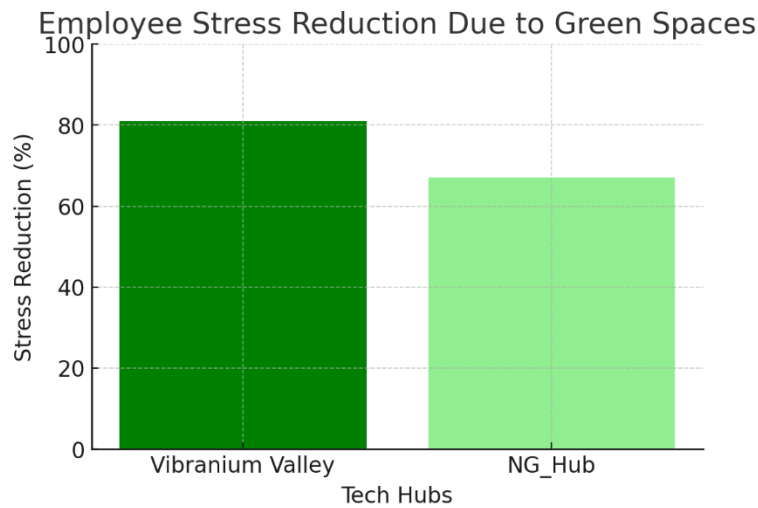
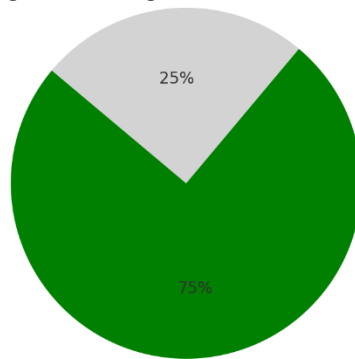


Figure 14: Bar graph showing employee stress reduction due to green spaces

Employees who regularly used outdoor seating areas and indoor plant-filled zones exhibited lower self-reported anxiety levels and increased job satisfaction scores.

#### Impact of Green Spaces on Employee Well-being

No Significant Change



Lower Anxiety & Higher Job Satisfaction

Figure 15: Pie chart of the impact of green spaces on employee well-being

Thematic analysis of interviews indicated that employees associated green spaces with a sense of calm and improved emotional well-being, with one participant stating, "Being around plants makes the work environment feel more relaxed and enjoyable, which helps me stay motivated." Additionally, the integration of biophilic design elements in these hubs fostered a stronger connection to nature, reinforcing a positive workplace culture.



## Thematic Analysis: Employee Perception of Green Spaces



Figure 16: Word Cloud on Employee perception of green spaces

### 3.2 Discussion

The findings align with existing research that emphasizes the role of biophilic design in enhancing creativity, productivity, and well-being in workspaces. The results demonstrated that larger and more accessible green spaces had a greater impact on employee performance, while limited or poorly maintained greenery offered minimal benefits. Additionally, the psychological benefits of nature exposure translate into better cognitive function, improved concentration, and lower stress levels. These results suggest that tech hubs in Lagos should prioritize green space integration to foster a healthier and more innovative work environment. Recommendations include expanding greenery within co-working spaces, increasing accessibility to natural elements, and incorporating vertical gardens or rooftop green areas. Ultimately, investing in sustainable workspaces with nature-driven design strategies will not only enhance employee satisfaction but also contribute to long-term workplace efficiency and innovation.

### IV. Conclusion and Recommendations

The study on sustainable workspaces within Lagos tech hubs has highlighted the significant role of green spaces in enhancing employee creativity, productivity, and well-being. The findings demonstrated that integrating greenery into work environments positively influenced stress levels, job satisfaction, and innovation. Employees who had access to green spaces reported higher levels of motivation, focus, and engagement, leading to an overall improvement in workplace performance. The data further supported that biophilic design principles, such as indoor plants, outdoor seating areas, and nature-inspired aesthetics,

contributed to a more relaxed and stimulating work environment. These elements not only improved the quality of work life but also strengthened organizational culture by fostering a sense of connection to nature. Given these insights, it is recommended that tech hubs in Lagos prioritize the incorporation of green spaces in their workspace design. Employers and designers should focus on maximizing the use of natural elements, such as vertical gardens, green roofs, and plant-filled work zones, to create a refreshing and stimulating atmosphere. Additionally, organizations should consider implementing policies that encourage employees to utilize outdoor areas for breaks and collaborative meetings, further enhancing creativity and reducing workplace stress. To sustain the benefits of green spaces, regular maintenance and investment in sustainable landscaping should be ensured. Organizations could also integrate technology-driven solutions, such as IoT-based environmental monitoring, to optimize air quality and natural lighting, further improving workplace conditions. Future research could explore the long-term effects of green spaces on employee retention and company innovation, as well as compare different workspace models to identify the most effective sustainable design strategies. Overall, embracing sustainable workspace design is a crucial step toward building a resilient and innovative tech industry in Lagos. By prioritizing nature in workplace planning, tech hubs can foster an environment that supports creativity, enhances productivity, and promotes employee well-being, ultimately contributing to a more sustainable and thriving work culture.



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